Waste not

South Carolina companies find successful ways to reduce, eliminate pollution

By Jan Easterling

High pressure fluid handling industries needed stainless steel parts free of external silver. But the unique threading on the inside of the parts required a silver coating, which no one in the plating industry seemed to be able to do. So companies spent time and money chemically stripping the external silver off until Rex and Tom Riddle stepped in.

They developed a process that silver plated the internal diameter only, eliminating the need for stripping. Once perfected, the process attracted more and more customers to the Riddle's Metal Finishing Services Inc. But just as the orders started piling up, so did the waste at the Sumter County company. Metal plating processes traditionally require huge volumes of fresh water for the process "baths," water that then becomes waste once it's contaminated with metals. Metallic sludge left at the bottoms of the process baths also is considered hazardous and must be handled, treated and disposed of in special, often costly, ways.

So Riddle joined the ranks of companies that over the past decade have successfully sought and implemented waste reduction techniques and technologies ranging from the simple elimination of disposable rags to the extreme purchases of water management systems. Most companies are finding that the initial outlays for equipment and changes in processes are creating long-term, bottom-line returns.

"We're seeing a significant number of industries finding various ways to prevent pollution on the front end of their processes so that their waste disposal costs, liabilities and regulatory requirements can be reduced and even eliminated," said Douglas E. Bryant, commissioner of the S.C. Department of Health and Environmental Control. "Reducing industrial waste is a particular focus for us and for industry today because landfill space is declining, costs are rising for industry, and the long-term liability for generators of hazardous waste doesn't end once it's in the ground."

The Center for Waste Minimization at Bryant's agency, along with a corps of retired experts affiliated with the University of South Carolina's Institute of Public Affairs, offers free, non-regulatory on-site assessments for businesses and industries on ways to reduce and eliminate waste streams, where to find recyclers or reclaimers for waste components, and alternative products with lower impacts on the environment. The center is funded through tipping fees at several landfills and incinerators and from the U.S. Environmental Protection Agency.

Both agencies typically offer assessments from retired corporate engineers with expertise in a range of production processes. USC also maintains a list of retirees available for consultations on "things you normally wouldn't hire a consultant for," said LeAnn Heren, technical assistance manager.

"These are generally people who were among the best workers, worked long hours at their specialties and were very involved with their companies. Now they've retired, and they're not used to gearing down. So South Carolina companies are getting the benefits of their years of experience, and the retirees are benefitting from the self-esteem that comes from contributing their expertise to the state," she said.

Many companies, like Riddle's, already have begun waste minimization programs when they seek on-site assessments. It's also a scary proposition, Riddle says, to be calling a state regulatory agency for help.

"In a small plant like ours, you live in constant fear. You go home wondering how many laws you've broken today. But we've taken the approach that we're going to do what we think is correct."

Metal Finishing has experienced a 1,000 percent growth rate since opening in 1983, the boom

coming in 1991 after the selective silver plating process was developed. By 1993, a production line was added, a second shift was started, and sales more than doubled, Riddle said.

But "we had waste problems that were creating operational problems. It became our priority over a year and a half to get hold of our discharges and sludge," Riddle said.

A five-year goal of near-zero discharge was established to curb hazardous waste and the loss of metals. The first phase included the design and installation of a water management process that uses spray rinses and air-operated diaphragm pumps. In subsequent phases they added a deionizer and two vacuum evaporators that capture and evaporate the metal-laden rinse water, leaving the condensate for reuse as rinse water and the metal-containing waters returned to the process. The results have been a 60 percent reduction in water use, a 92 percent reduction in sludge volume, and more than 70 percent reductions in use of each: nickel chloride, potassium cyanide and silver.

The Center for Waste Minimization's on-site assessment came during the phase-in of the equipment purchases. While no new revolutionary ideas came from the visit, Riddle said, the center's staff pointed out that disposable rags contaminated with solvents could be classified as a hazardous waste. Laundering reusable rags, while more expensive, removes the hazardous liability.

Many times it's the small things that industries don't notice in their quest to reduce and eliminate waste, says Jerry Alert, a former Formica Corp. chemical engineer who now performs waste assessments. "Sometimes people are so focused on upgrading processes that they don't pay attention to what's going out the back door."

Alert said he provided a consultation to one 200-employee company that now saves $120,000 in annual landfill costs just by recycling solid waste.

Saving landfill space is an issue at Dependable Drum, which has eliminated the need for up to 1 million cubic feet per year of regional landfill space by improving its drum recycling process. So it was ironic the Center for Waste Minimization staff pointed to recyclable aluminum cans and office paper in the Greenville County company's landfill-bound trash as an obvious way to further reduce their waste stream.

"It's helpful to get another set of eyes on what we do," said Vice President Gary Glickman.

More than 2,000 requests for assistance had come into the center by the spring of 1997, about seven years after its inception. Staff also conducted 420 on-site waste assessments. Clients

have reported savings in waste management expenses of more than $2.8 million, with ranges per industrial facility from $5,000 to $400,000. Industries also say they have collectively reduced annual oil and solvent use by more than 600,000 gallons, solid waste by 329,000 tons, hazardous air pollutants by 4,000 tons and other hazardous materials by 630,000 pounds.

Waste minimization staff encourage industry to incorporate waste management policies into business practices by pointing out the environmental benefits, the disposal and material cost savings, and the increased manufacturing efficiency that can occur with most waste reduction modifications.

And there are hidden cost benefits, such as in reduced insurance costs for eliminating flammable materials and in reduced frequency of reporting required by state and federal regulators based on the volume of waste and raw materials generated or stored on site.

In 1997, 51 industries that received waste assessments by the Center for Waste Minimization were surveyed by the Center for Environmental Policy at USC's Institute of Public Affairs. About 55 percent of industries had begun or had partially or fully implemented waste reduction measures recommended by center staff. Respondents were split, however, on whether the option was saving money or costing money. Among those that had not implemented options, reasons most frequently cited were that the options were

not technically feasible or more expensive, need local recycler, or the waste identified had low volume.

Respondents said the largest changes came from reductions in hazardous and nonhazardous waste generation rates. A few mentioned a change in air and water emissions and energy use.

Some companies reporting success stories in waste reduction include:

C Cherokee Finishing in Gaffney, which found that albumin, virtually the same substance as egg whites, works just as well as chromic acid in its plating operation. The change now produces 60,000 pounds less hazardous waste. Modifications also have resulted in a 60 percent drop in disposal costs, a 30 percent drop in hazardous raw materials costs, and water use savings of 3 million gallons a year.

C The costs and dangers of hazardous methyl ethyl ketone (MEK) and xylene gave rise to Beverage-Air's goal of becoming an operation that requires no environmental permits. So far, reductions have allowed them to bypass rigorous requirements of a Title V federal air emissions permit. Additionally, an 85 percent reduction in hazardous waste and a 28 percent reduction in solid waste has reduced their disposal costs and liability considerably. To meet those goals, Beverage-Air, which makes commercial food and beverage cooling equipment, looked at its solvent-based painting process, which required toluene and xylene for thinning and cleanup. The company converted to powder coating and modified the painting area to include an "environmental" room built around the powder booths to catch overspray. So far the company has reduced MEK use by 75 percent and has eliminated xylene and toluene. A switch to a new type of foam installation gun also has virtually eliminated the need for methylene chloride used to wash the old equipment.

C Frigidaire in Anderson had much the same problem in its painting operation and found the solution to solvents in a powder paint coating system. It required an investment of $1.5 million, but the company has experienced a 97 percent drop in disposal costs of regulated wastes in six years, going from $150,000 a year to $5,000 a year while production rates doubled. Additionally, the company is logging more than $1 million in savings from lower raw material costs, less scrap, lower energy and operating costs, and reduced service calls.

With increased attention to industrial air emissions, industries also have been focused on reductions of volatile organic compounds, which create ground-level ozone:

C DuPont's Cooper River Plant near Charleston spent $3.5 million to eliminate 60 percent of volatile organic compounds emitted from process cooling towers and an additional $30,000 to reduce methanol emissions by 95 percent from storage tanks and rail cars during loading operations. On-line process filters reduced the frequency of cleaning out process lines and tanks, thereby reducing the amount of waste and wastewater generated by cleanouts. By next year, DuPont expects to reduce its costs by $1 million annually from a $155,000 investment in a fiber finish facility upgrade, which now allows the company to treat fiber finish waste onsite biologically rather than shipping it out for disposal. In one year alone, DuPont found recycling uses for almost one-half million tons of solid waste.

C Volatile organic compounds created when Dixie brand paper plates were coated also posed a problem for the James River Corp.'s Darlington plant. About 70 percent of the volatiles were hazardous air pollutants. Company officials converted to lower-cost water-based coatings by replacing the existing coating decks on the plate printing press. While the cost to the company exceeded $400,000, annual savings reductions should be $574,000, with the air permit fee costing $10,000 less because of the reduced emissions. They also reduced

the risk of transport and unloading accidents, the need to store the flammable material in an underground storage tank, and the need for costly emission controls.

Water – the amount coming into the plant as well as what leaves it – was the issue at Dependable Drum when Glickman and others began looking at environmentally friendly ways to increase production at the Greenville County facility. The company reconditions and recycles all types of drums used by businesses and industries, a process that requires substantial amounts of water and creates an equally great amount of effluent.

"We were at the extent of our current capacity on our system, so we began looking at upgrades," Glickman, the company's vice president, said. "While we were doing that, we also wanted to make sure that we were not increasing the quantity or affecting the quality of our effluent." The company also was aware of planned new discharge requirements, so the system had to be designed to meet those parameters, he said.

The efficiency of the process water recycling equipment, which went online at the end of 1995, has allowed Dependable Drum to increase production by 50 percent over 1996 levels while reducing by half the 6,000 gallons per day of effluent. The freshwater requirements have dropped from as much as 14,000 gallons a day under the old system to 1,100 a day. Natural gas bills have dropped from an estimated $3,500 a month to $400 per month.

"The system should pay for itself in 18 months, and we consider that a good return on the investment," Glickman said.

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The Center for Environmental Policy is seeking retired engineers and corporate environmental managers for a project this year to assess energy efficiencies or provide environmental assessments in industries. For more information or to volunteer, call the institute at (803) 777-1864. For more information on the Center for Waste Minimization, call (803) 734-4761.